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VETERINARY JOURNAL

Editor :

FREDERICK HOBDAY, F.R.C.V.S., F.R.S.E.,

HONORARY VETERINARY SURGEON TO HIS MAJESTY THE KING; MAJOR IN THE ARMY VETERINARY CORPS, AND FORMERLY PROFESSOR IN THE ROYAL VETERINARY COLLEGE, LONDON.

Sub-Editor :

GLADSTONE MAYALL M.R.C.V.S.

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Editorial.

FOOD SUPPLY.

INCREASED food supply depends upon increased agricultural activity at home, or additional imports of food stuffs from overseas. The liveliness of the enemy submarines is perceptibly curtailing the supply of imported food stuffs. We depend more and more upon energy and foresight in our own Isles to overcome the deficit.

The whole matter of a stable and progressive increase of cereals, flocks, and herds, rests upon certain factors which are hard to drive into the understandings of the majority of politicians. Agriculture has never been represented in the House of Commons as strongly as it deserves to be, considering its paramount importance to the well-being of the nation. The manufacturers, the financiers, the law makers have all had their interests better cared for and looked after than the farmers. The farmers need more men of their own class to represent them in Parliament before, under present conditions, they will secure the necessary driving force to put agriculture at full and safe speed ahead. To get the best human material back to the land and to produce the willing and patient peasant who nurses the soil lovingly and profitably, and gathers from it a wealth of nutriment that enables man and beast to live, we must house this valuable worker and toiler in a comfortable and decent fashion.

The first and root factor in any material agricultural revival is an increase in the number of good rural cottages. We are not out to write where the money is to come from to build these houses, but we note that the National Health Insurance Committee seems to have a surplus of £12,500,000 on recent working, and suggest that some of this excess money might be expended in this way. The healthy man

often wonders what he gets out of the National Health Insurance scheme. Almost all of us contribute to it. Have we ever calculated what we get out of it? Security of tenure for the tenant farmer, and good wages for the agricultural labourer are two vital factors in true agrarian advance. In some cases the men elected to County Councils and other governing and administrating bodies have been veritable examples of square pegs in round holes (men uninterested entirely in the land), whilst well known agriculturists whose advice and counsel would have been invaluable have been ignored.

The men who control the purse-strings of the Treasury need also to be knowledgeable men, able to take long views, to recognise that social, moral and economic benefit come to a nation from wise, remunerative land enterprises. The give £100 spirit, when it has been decided by those who know that £200 is necessary, wants getting rid of for ever from Treasury procedure.

The unfortunate thing at the present time is that there is a shortage of labour on the land. In England and Wales wheat and oats show a less area of cultivation and a less yield of bushels per acre in 1916 than in 1915. Wheat, beans, potatoes, peas, and mangels, were in supply far short of our requirements. The cultivation of sugar beet has been quite insufficient.

Horses have increased in number from 1,287,180 in 1915 to 1,359,570 in 1916, and cows and heifers have decreased by 31,000, whilst pigs are reduced by 252,000. The importance of milk and pork in times of stress is well known and steps ought to be immediately taken to check these decreases. It is not to our credit that we produce the smallest number of pigs amongst great agricultural countries.

Ireland, not troubled so much as her sisters by labour shortage, has shown a gratifying increase in her stock production. Horses have increased by 38,000, cattle by 126,000, sheep by 163,000, pigs by 85,000, goats by 50,000, and poultry by 383,000. Hay has shown almost a record crop, 2·3 tons to the acre. Scotland shows a decreased crop in wheat and potatoes, and, as in England, an increased crop of barley. The moral is obvious and is chiefly a matter for the Treasury. Cows, sheep, and pigs show a decrease in Scotland, whilst horses have been on the up grade.

What will be the result in 1917? Who can tell?

With a wise progressive policy and adequate labour, we may not only weather the storm, but plant the roots of a firm and flourishing agricultural revival, which will give the industry the security and status that it ought to have had long ago in our Island home. This security and status ought to be grounded and founded for ever. To succeed and to establish our position on the rock we must insist on the

things mentioned in this article being done, and a few others that will occur to the man thinking all round the subject. We cannot do better than close our thesis with the words written recently by Mr. H. W. Palmer, the Secretary of the National Farmers' Union. He writes:—"We can play with politics, with industry, with law, and even with the consuming fires of 'civilised' warfare, but if we value the future of our country, our Empire, and our race we cannot any longer afford to play with agriculture." G.M.

Original Communications.

"TIPS" ON CAMELS, FOR VETERINARY SURGEONS ON ACTIVE SERVICE.

By Captain A. S. LEESE, M.R.C.V.S.

An apology is necessary for placing these notes before professional readers in a somewhat random form. The war has prevented me from finishing a book on the one-humped camel; my notes and records are waiting in England, and I am writing now from memory. Camels are to the fore in several theatres of war, and it has struck me that there are not many veterinary surgeons who have lived along with camels in the only place where they can be really studied in health as well as in sickness—that is, their grazing country, the bush and the desert; and that possibly some service may be rendered by jotting down some of the conclusions formed and experiences gained in eight years of life under those conditions on three continents.

I shall attempt only an outline of what is known about camel-disease in the hope that it may be of assistance to veterinary men whose experience has, hitherto, been with animals other than the camel, and who find themselves in veterinary charge of camel-units in this war; only points referring to male working camels will be touched upon. Camels are splendid patients, because they rest well, make little of pain (within reason), and are easily handled. One veterinary surgeon who is keen can do more to alleviate the sufferings of camels than all the societies that ever existed for befriending animals. But nothing can be done by standing around slapping your leg with a cane.

Rutting.—In the Northern Hemisphere, rutting in camels occurs in the latter half of the cold weather, except in Somaliland. If grazing has been good the previous hot weather, a camel may rut from December to March. Usually it is in January and February that male camels are most violently "musth." There is no need to describe the symptoms; they are obvious enough. The pink or piebald "bladder" which is periodically belched out of the mouth of a musth camel is

simply the expansion of the soft palate which is normally lodged in the pharynx. Among a number of male camels running together in the jungle, the biggest and strongest only becomes musth ; if another camel begins to get musth there is a fight between the two ; the winner continues to be musth and the loser ceases rutting.

Veterinary advice may be sought as to how to combat the injury done by musth camels ; because musth camels are more vicious than usual and may inflict severe injuries on men or other camels (thereby greatly increasing the number of casualties in camels) , moreover musth camels do not thrive, and they are noisy, and dirty to handle.

The difficulty may be got over entirely by a general policy of castration of all working males, but this has serious disadvantages. Castration before six years of age leads to great deterioration in bone, muscle, and stamina, the gelding becoming, in fact, rather like the cow-camel in general appearance ; castration over the age of six is liable to be followed by a fair percentage of loss due to the operation, and this loss, it must be remembered, is of camels in their prime, and is therefore no trivial one. The minimum of loss is sustained by using a " castrator "; the best are of colonial patterns. The cord should be severed as high up as can be reached. Adult camels should be chloroformed for the operation. Unfavorable sequels are much as in the horse ; enlargement of the stump is one, but it is more amenable to removal than true " scirrhus cord."

In India and Egypt it is not the custom to castrate camels. In Somaliland, about 65 per cent. of camels are castrated ; of these, a few are destined for eating, but the majority are done simply to obtain peace in the herds ; for the Somali camel does not normally do much work except during short periods, and is not required for heavy loading. In Australia, only the camels used in teams (in harness) are gelded : this is done to prevent fights in the team. Throughout the camel world, the entire is easily recognised to be larger, stronger and a bigger weight carrier than the gelding, unless the latter was operated on as an adult.

When castration is not adopted, the best treatment for a musth camel is hard work. He should be given all the odd jobs, and will lose less condition by hard work than by being left alone with his thoughts. The damage he does is chiefly by his tusks ; these may have the points cut off by a saw not more than ¼ in. from the point, and rounded off afterwards with an equine tooth-rasp ; he will not then be able to inflict very serious injuries. Musth camels may inflict fatal injuries by biting other camels in the throat, jugular vein, testicle, or flexor tendon-sheaths.

NORMAL AND ABNORMAL TEMPERATURE, PULSE AND RESPIRATION.

The Temperature is as useful in camel practice as a guide to diagnosis as it is in horse-practice, but the normal fluctuations, which are great, must be known by the veterinarian. In the camel, the temperature is at its lowest at dawn and gradually increases until sunset, after which it gradually sinks again during the night. In addition to this, there is a great variation in temperature as between one day and another. The normal temperature may be described as follows :—At 6 a.m., average 97·5° F., extremes 94° to 98·6° F. At 6 p.m., average 100·6° F., extremes 99 to 101·7° F. at noon ; the temperature is halfway between these figures. The highest normal limits are reached on days or nights of stifling heat ; and a cold rain-storm may reduce the temperature of the animal to the lower limit. When camels are much worried by flies, the temperature is useless as a guide.

Fever is present if under ordinary conditions the temperature is :—
At 6 a.m., over 98·6° F. ; at 6 p.m., over 101·7° F.

Pulse varies a good deal in frequency, generally 45 to 50. It is most palpable in the posterior tibial artery in the sitting position with hind feet flat on the ground and hocks raised.

Respirations.—Five to seven a minute during rest, but are most frequent at midday. Anything over twelve a minute is abnormal. Camels readily show the clinical alterations in the character of the respirations associated with the painful febrile diseases, such as pleurisy and peritonitis. Respiration is greatly increased in frequency by pain.

SYMPTOMS OF ILL-HEALTH.

Fever.—Besides the abnormal temperature already described, the common symptoms shown by feverish camels are loss of appetite, cessation of cud-chewing, increased respirations, drooping forward of head and neck, and a slight discharge of tears over the face. Fevered camels often prefer to face the sun ; the tail is motionless and the wrinkles over the upper eyelids smooth out. A warning must be given here against judging a camel's appetite by the way he tackles his rations ; many camels will be quite "off feed" on the grazing-ground, and yet will come in and clean up their rations as usual. Grazing requires a certain amount of effort, and the fevered camel will not make it. Consequently, it is necessary to ascertain how the patient behaved when out grazing, if one is to judge "loss of appetite." A camel which will not eat his grain ration is generally more than a little sick.

Pain.—Abdominal pain is shown by rolling about, as in the horse, or by sitting with the hind feet tucked to one side, and the belly pressing on the ground. The number of respirations is greatly increased. Pleurisy is shown by the classical changes in the respiration. Peritonitis (which occurs without warning in the camel) is

accompanied by a marked interval between inspiration and expiration. Intense pain elicits lugubrious moaning and lachrymation. Grinding the teeth occurs sometimes in " lung abscess " ; but is normal in musth camels or in camels which have just eaten salt. Grunting is in the same circumstances as with cattle, but generally on rising from the sitting position. Another warning is, perhaps, advisable here ; that is not to assume hastily that a sitting camel which is frequently fidgeting from one side to the other is suffering from colic ; it is more likely suffering from an injury either to the " pedestal," or another pad.

Cough.—Natives are very unobservant as regards the cough in broncho-pneumonia in camels. This is a soft, sigh-like cough, and is most often observed in the early morning, and soon after a camel rises from the sitting position. Violent fits of coughing occur sometimes in pharyngitis, laryngitis, and bronchitis ; they may often be stopped by seizing the camel's head and holding it down with the lips touching the ground (the camel being in the standing position) for a minute. The common cause of chronic cough in camels is abscess in the lung ; this is a sequel to pneumonia, and is not usually pyæmic from wounds, as I have seen suggested.

Nasal discharge is seen in catarrh. In frontal sinus trouble pus generally comes from *both* nostrils and does not smell ; it is unlike equine cases in these respects.

Diarrhœa occurs readily with certain changes of grazing. Salvadoras, seaside salsolaceous plants, mangrove, wild jujube and many other good grazing bushes will cause it when camels first come on to them, as also will various fodder crops fed green. A nervous camel will have diarrhœa if he is frightened or hurt.

Constipation.—Normally the dung pellets are soft, convex on one side and concave on the other. With constipation they become cylindrical, hard and dry, and this is particularly the change one looks for daily as an indication of over-dosing when treating trypanosomiasis by methods involving the use of Soamin (Atoxyl).

Debility.—The common causes of debility in military operations are overwork, under-feeding, working at unsuitable hours, exposure to cold, working hard before the second pair of incisors is cut, mange and its curative dressings, want of time to acclimatise in imported camels, unfamiliar nature of grazing in imported camels, advancing age, and trypanosomiasis. Trypanosomiasis is, excepting in Australia and in the Somaliland Protectorate, by far the most important disease of camels ; it is widespread, difficult for the inexperienced to deal with, often difficult to diagnose, and few Camel Corps are entirely free from it. When every precaution is taken against it as a routine measure, and when the C.O. can be convinced of its

overwhelming importance, it can be kept under control ; not otherwise. During peace time, the efficiency of the camels in Camel Corps chiefly depends on the thoroughness with which this disease is provided against. No one but an experienced veterinary surgeon is competent to supervise the routine measures which have to be taken to prevent trypanosomiasis getting hold in a Camel Corps. Much of the heavy mortality from trypanosomiasis in military and civil transport and riding camels is due to the want of competent veterinary control, and to practices based on the extraordinary theories which C.O.'s are apt to indulge in with regard to the disease if allowed to do so.

Among the less common causes of " debility " are tuberculosis, very heavy invasion of lungs and liver by hydatids, filariasis (if very heavily infected), internal abscesses, and overgrown molars. If a " debility " case fails to improve at all after five weeks' good feeding and attention, and is not suffering from either trypanosomiasis or filariasis, it is best to destroy the animal. Camels which get very low often suffer from a severe anæmia with atrophy of the heart-walls, which nothing will cure. Such cases entirely lose their " back-muscle " and that of the quarters.

There is a certain conformation often met with in camels which should be avoided when purchasing, as the animal so built never does well. A fair-sized hump may be present in the conformation referred to, yet there is a deep concavity just below the withers, and there is a sort of trench along the back on each side of the hump ; the quarters are flat or concave, and the ribs are very obvious. The function of the hump, as a storehouse of fat to be drawn upon according to the needs of the animal, appears to be in abeyance in these camels.

A peculiar feature in " debility " cases is the enormous variation between the morning and evening temperature, without any fever being present. The difference may be as much as 7° F. (94° to 101°).

Trypanosomiasis.

It is unnecessary to remind professional readers that this disease is a recurring fever due to trypanosomes in the blood, and that, in the intervals between the febrile attacks, trypanosomes are generally absent from the blood. I propose only to sketch very briefly the characteristics of the disease as it affects camels.

Firstly, as to its course and symptoms :—

(*i*) It may be acute, with almost continuous fever with trypanosomes present in the blood nearly all the time, and a fatal termination within a few weeks.

(*ii*) It is *more often* sub-acute or chronic ; in the latter form the intervals between the febrile attacks are longer than in the sub-acute

form and the febrile paroxysms are of shorter duration. Characteristically the febrile periods in these forms may at first be from two to five days and the intervals from three to nine days. In recovering cases, the intervals get longer and the febrile periods shorter.

(*iii*) After a number of febrile paroxysms the camel begins to lose condition. This is far more marked if the camel is at work than if he is at rest, but happens in any case.

(*iv*) Clinically, strong suspicion of trypanosomiasis is aroused by the following symptoms (in male camels) :—Irregular appetite, as shown on the grazing ground ; on some days he grazes well, on others (when the fever is on him) he stands listlessly about. The same camel may have a perfectly good appetite for rations at any time. The flank is always somewhat hollow, as the belly is rarely filled. The camel gradually shows a loss of muscular tone and does not carry his head as he should do ; it droops so that the bridge of the nose is below the level of the poll. The symptoms of fever, particularly the discharge of tears, may be noticed, but are not very marked in typical cases. Eventually he becomes thin and hidebound. The long hair near the ends of the tail easily comes out when pulled ; this is an excellent test as to whether a camel is going " downhill " or not ; when the hair-root brings with it a white speck of tissue, the camel is generally picking up ; if it appears naked (black, like the rest of the hair) the camel is nearly always on the downward track. The urine in trypanosomiasis frequently has an aromatic smell which may be noticeable towards the end of the tail. From the above description, it will be seen that there is nothing very pronounced in the symptoms of a typical case, and that is why it is so important to remember that :—

The symptoms often go unnoticed by the camelman himself for long periods.

(*v*) The duration, followed by death, may be any time up to three or even four years ; but the average for sub-acute cases is about one year. Recovery takes place in about 20 per cent. of camels if they receive good food and are rested most of the time throughout the disease ; but this recovery follows three years of sickness and is therefore of not much account from the practical standpoint, although these recovered cases are immune afterwards. Recovery may be expected if the affected camel improves in condition, and if the febrile periods gradually become more rare.

(*vi*) Death may take place in various forms, it may be sudden, and if the symptoms of trypanosomiasis have not been noticed previously it may be put down in error to anthrax, snake-bite, " cussedness," and so on. Frequently a broncho-pneumonia finishes up the affected

camel. He may die of anæmia and cardiac atrophy after slowly declining for months or years.

(*vii*) If a fresh blood preparation be taken from the tip of the ear during a fever paroxysm, the trypanosomes are easily seen moving about under a one-sixth objective. This is the definite means of diagnosis and can be done easily in the field. As a rule, it is not possible to find trypanosomes during the intervals between fever periods. As the disease is so common and the symptoms are not very marked it will now be recognised that a small microscope furnished with a one-sixth objective is a necessity, and not a luxury, for every camel doctor.

(*viii*) Although it is easy to confirm a diagnosis of trypanosomiasis by microscopic examination, it is not so easy to say that a camel is *not* suffering from this disease; to do that one would have to take the temperature daily for at least ten days, and examine the blood when any fever is found; that would, for ordinary purposes if the examination proved negative, be enough to exclude a diagnosis of trypanosomiasis in its acute or sub-acute forms, but a much longer period of observation would have to be undertaken to exclude the possibility of "chronic" trypanosomiasis, especially if it has a tendency towards recovery, because then the intervals between the fever paroxysms may run into months, and no trypanosomes will, as a rule, be found by examining the blood in these intervals. Inoculation of blood into small animals may give positive results in some of these cases; but a negative result does not justify any decision as to diagnosis.

(*ix*) In addition to diagnosing the disease, a veterinary surgeon must determine, if he can, by observations on the frequency and severity of the fever paroxysms, and by the other symptoms shown by the patient, whether the camel is going "downhill" (*i.e.*, whether he is suffering severely from the disease), or whether he has a tendency to recover. Without this knowledge, it is difficult to decide what to do with the patient.

As regards etiology, I have attempted below a summary of the main facts; the difficulty is to do it justice without writing a volume:—

(*x*) Trypanosomiasis is chiefly spread in camels by biting-flies. Excluding the tse-tse flies of Central Africa, in the bodies of which various trypanosomes undergo part of a definite life-cycle, it is the tabanus fly which acts as the chief agent in the spread of trypanosomiasis in the camel. All clinical experience is opposed to the view that the trypanosome undergoes any part of its life-cycle in this biting-fly; the tabanus seems to act as a mechanical carrier direct from a diseased camel with trypanosomes in his blood to a healthy camel. It is the habit of the fly to bite several camels before he fills his belly with blood; and the reason that he has to fly from one camel to the

other is that his bite is painful and, as a rule, leads to attempts by the camel to dislodge him. Experimentally, this direct inoculation by the means of large tabanus flies is very easy to demonstrate, and any observer who has spent time with camels grazing in a heavily-infested tabanus " zone " can see for himself the flies doing the same experiment " on their own."

Camels with acute or subacute trypanosomiasis have the parasites in the blood very frequently, and, indeed, on some days the blood is simply a mass of them, to such an extent do they swarm in it.

The extent of the spread of the disease in a herd of camels obviously, therefore, depends on the number of tabanus flies in the locality and on the number of " reservoirs " of infection, *i.e.*, the proportion of camels already affected with the disease. If the number of tabanus flies is small, and the veterinary control over the camels is such as to keep the herd free of all but the most " latent " cases (that is, chronic cases well on the way towards recovery), the disease has not much chance to spread. Where tabanus flies are plentiful, and where veterinary efforts against the disease are regarded as a " fad," and therefore a large proportion of unrecognised cases are left in the herd, nearly all the camels will get the disease, excepting the few that have gained immunity by passing through the three years of disease in their younger days.

The disease will always be serious, even when the herd is under frequent examination for affected camels, if they live where tabanus flies are numerous, because a few cases which escape the keenest detection can infect so many flies. Similarly, where no attempt is made to detect affected camels in a herd, and where tabanus flies are present, though not numerous, the disease spreads pretty widely, because the flies, though few, are so frequently sucking infected blood.

Other biting-flies may act as transmitters of the disease, provided they are very numerous and can operate on a herd already pretty full of " reservoirs " (undiscovered cases). Lyperosia, Stomoxys and Hæmatopota have evidence against them; Hippoboscidæ and mosquitos have none. If proper precautions are taken against " reservoirs," there is no need to take into practical account any biting-fly but tabanus (in any camel-country other than that adjoining equatorial Africa).

(*xi*) Tabanus flies are seasonal in most countries, and are found in largest number during and after rains, chiefly those falling in hot or warm weather. In very cold or dry weather, they are either scantily present, or absent. It follows that there is generally a definite " trypanosomiasis season " (there may be two) and the spread of the disease is, generally speaking, confined to these rainy seasons.

Another complication to this complicated problem is that in some places tabanus flies never breed, and these places remain havens of refuge for camels in the trypanosomiasis season. The "desert," with its vegetation refreshed by the rain, makes camel-keeping possible in many countries where otherwise the animals would be wiped out by trypanosomiasis. Every hot-weather-rains, the tabanus-free desert is the refuge of camelmen, who have learnt, by the tribal experience of centuries, that their camels cannot be maintained in well-watered localities in the rainy season. A sandy soil is almost a guarantee of a tabanus-free "zone"; but the character of the vegetation is another good guide to experienced men, because the amount of moisture suitable for breeding tabanus is sufficient for the presence of certain kinds of trees and bushes; nothing but jungle-experience will teach these things. As a rough guide, it may be said that in or after the rains herds of camels are liable to be severely affected by trypanosomiasis if grazed or kept in the following zones:—(*a*) Rice-country; (*b*) low-lying country liable to flooding; (*c*) jungle chiefly composed either of the largest sized acacia trees, or of low tamarisk bush. Canal-irrigated country varies a good deal as regards the number of tabanus flies. The Himalayan foothills with their heavy rainfall, and any low-lying heavily grassed country, are infested by tabanus in the rainy seasons.

Preventive measures are all-important; success in camel-keeping in India and most camel countries, excepting Australia and the Somaliland Protectorate, depends on them. They are:—

(*i*) Provision of grazing throughout the tabanus seasons in country containing few or no tabanus flies.

(*ii*) Early diagnosis of affected camels; this is done by establishing, as a routine of stable management, the taking of the temperature of all camels at least twice a week; it is easily and quickly done by employing about ten thermometers ($\frac{1}{2}$ minute) with ten camelmen to insert and retain them. Any camel with a fever temperature should have a drop of blood taken from the tip of the ear and be examined under one-sixth objective for trypanosomes. A portable microscope suitable for this work costs only five pounds.

(*iii*) Segregation, into veterinary hands, of all cases discovered.

(*iv*) When purchasing camels into a unit, the same precautions as in (*ii*) are necessary; and, since a one-day examination is all that can usually be obtained, the purchasing officer should have as great experience of camels, and of trypanosomiasis, as possible.

(*v*) When it is inevitable that camels should be sent into country heavily infested with tabanus, keep them in small groups; and it may be useful to remember that in very hot weather, tabanus is chiefly active from dawn to 10 a.m. and from 4 p.m. to dusk, whilst in cool

weather he prefers to bite at midday. *Carcases* of camels dead of trypanosomiasis are not long infective in hot climates, and biting-flies do not suck their blood. There is no need to burn the carcase, but it will wipe out the local population of pariah dogs and jackals which eat it.

Treatment of camels with trypanosomiasis.—Keeping in mind that these notes are intended for veterinary surgeons on active service, it is quite clear that segregation of affected camels with a view to the natural recovery of a minority (about 20 per cent.) after three years is quite an impracticable idea. Camels discovered with trypanosomiasis will come under two classes :—The first (the majority) will be on the downward grade and actively diseased, the second (the minority) will be on the road to natural recovery if given the necessary chance. It is only by observation over a period of weeks that one can tell which category a patient belongs to ; this observation will, in the first class of patients, show oft-recurring and serious febrile paroxysms and falling away in condition ; in the second class, it will show slight paroxysms of fever lasting only a day or two, and long intervals between the paroxysms. The first class may be dealt with in various ways, viz.:—

(*a*) They may be destroyed, so as to prevent them acting as reservoirs of infection to healthy camels. Some may be used by the butcher.

(*b*) They may be worked in segregation as long as possible and then destroyed. They will not last long under this treatment. Under certain circumstances this procedure can be adopted for dangerous and unavoidable " tabanus " stages on a route.

(*c*) They may be put under curative treatment. This treatment cures between 50 and 65 per cent., generally nearer the former figure. Emaciated animals are unsuitable for this treatment. The treatment is by the use of various compounds of arsenic and antimony. The simplest is the injection of Salvarsan (tried in Egypt by F. E. Mason), but it costs nearly as much as a new camel. The other methods have grave disadvantages—all are clumsy, involving ten or twelve intravenous injections ; great accuracy in dosage and keen observation of camels under treatment is essential, and it is very hard work to treat, say, fifty at a time ; for these reasons it can seldom be placed in the hands of any " native " veterinary graduate. The drugs cost from three to six shillings per camel, and treatment is a matter of twenty to twenty-three days. A few camels will die of over-dosing, and the ones which are not cured will relapse any time up to ninety days after treatment, but generally within a month. Camels cured by drugs are not immune. These methods of treatment have all been fully described in veterinary literature, and it is likely that some day they will be improved upon. In the present war, I had the hardest work to treat about eighty camels out of a strength of 103 by these methods under

camp conditions and single-handed; the camels had to live during treatment in a tse-tse fly zone where no stock can survive, and were undoubtedly re-infected just as soon as they were cured; nevertheless, only three died in two months out of 103, although doubtless many have died since. The trypanosome in this case was of the *T. congolense* type not the usual *T. evansi*. The best of grazing and of good rations are required during treatment.

The second class (camels with a marked tendency to natural recovery) should receive rest and good food and grazing, in segregation. This may be continued until no fever periods have been observable for, say, two months, by which time, if condition has been regained, the camel will be capable of a fair amount of work, and is unlikely to go wrong; at the same time, trypanosomes will be so rarely found in his blood that, as long as the camels are kept away from bad tabanus "zones," he will be negligible as a "reservoir."

In spite of everything that has been said, "tryp" camels are so difficult to deal with that no efforts in prevention should be spared.

Prevention on the march into new country.—It is to be hoped that this will become necessary on several fronts. There are just three facts to impress:—

(*a*) If nothing is known of the fly-zones in the country ahead, a competent man should be with the first line transport to survey for tabanus and report. Immense loss could be saved in this manner.

(*b*) Tabanus sleeps at night. Unavoidable "bad" places can be negotiated at night without loss. (*N.B.* The tse-tse, *Glossina pallidipes* of East Africa, is more active at night than in the day.)

(*c*) Before the war, there were indications in East Africa that dosing with arsenic against trypanosomiasis might have preventive value. It is to be hoped that some one will get to work with tests in the field on this most important point and get results, one way or the other, to satisfy scientific critics.

One last word with regard to camel trypanosomiasis. It is frequently stated by those of superficial experience that trypanosomiasis does no harm to a camel if he is not worked. This is utterly and disastrously wrong.

Opportunity permitting, in future articles a brief survey of the camel's infective and "sporadic" diseases and of his parasites will be attempted; and a short description of his lamenesses, fractures and other injuries, with their treatment, of the poisonous plants he is liable to eat and their effects, and of any other matter likely to be useful to veterinarians finding themselves in charge of unfamiliar patients in the shape of camels.

(*To be continued.*)

XUM

IMPETIGO.

By GEORGE GAIR, M.R.C.V.S.
Cononbrige.

WHILE accompanying the Medical Officer of Health for this county in his inspection of local public schools, a considerable number of the pupils were found affected with Impetigo Contagiosa. Some scrapings were taken from the affected skin surfaces of the children. I made smears of these scales by pressing them between two glass slides, and stained with carbol thionine blue and Gram. Large masses of micrococci were found (staphylococci) which retained their stain with Gram's method. They showed well with carbol thionine blue. The organisms grew well on agar at 37° C. and pure cultures were obtained. Impetigo is a non-febrile contagious skin disease peculiar to school children, although adults are sometimes affected. The disease in children is characterised by the formation of pustules on different parts of the body, particularly the face and hands. No itching exists, and the pustules are followed later by thick, soft, honey-like crusts. The disease is highly contagious, and is not uncommon in schools and similar institutions where large numbers of children congregate. They rapidly pass the disease one to another. Several writers refer to this disease in horses, dogs, and swine; but in no instance could I find any mention of an organism being the cause of the infection. Some of the writers allude to infectious impetigo developing during such diseases as distemper, strangles, swine fever, hog cholera, and rinderpest. The organism usually found in the human subject is the staphylococcus aureus, and possibly the s. albus. Occasionally a streptococcus has been found, but I have not obtained any form of the streptococcus in the human subject. Some authorities describe impetigo as including all eruptions characterised by large pus blisters (exanthema, which occurs in dogs after suppurating mange, Canadian horsepox, swine fever and cattle fever); but, again, no mention is made of a causative organism.

Another disease which closely resembles impetigo is pemphigus contagiosus of warmer climates; European children are more prone to it than native children in the tropics. The native adult rarely contracts it. Sir P. Manson obtained a diplococcus in these cases from the epidermis and fluids of the blisters. Having made no cultivation of the organism, he consequently could not say whether or not the organism discovered was responsible for the disease.

The organism obtained from the crusts of the school children was a spherical coccus 0·75 μ to 1 μ in diameter. It appeared in the direct examination from the crusts or scales as a grape cluster-like mass. It

grows at room temperature or blood heat, causes turbidity in broth, gelatine begins to liquefy whenever growth appears. In stab cultures liquefaction extended all along the culture, the colour turning orange-yellow. On blood agar and ordinary agar a thick growth appears, at first pale in colour, but ultimately becoming golden-yellow. The organism is like the staphylococcus pyogenes aureus. The surface of the body seems to be the natural habitat of this organism. When this organism is rubbed into the skin local inflammation follows, with small pustules (impetigo). A feebly virulent variety of the s. pyogenes is frequently found on the skin (staphylococcus epidermis albus). Welsh found it deeply buried in the epidermis, rendering it difficult to destroy by means of disinfectants. It can be differentiated from the s. pyogenes aureus, which ferments manuite, with production of gas, while the s. epidermis has no such action. I have found the staphylococcus in impetigo of young dogs. It also is Gram positive, and grows well on agar.

While the human and canine forms of impetigo are evidently caused by a staphyloccal infection, and at times probably by a streptococcus, it would be interesting to know the nature of the causative organism in impetigo in the horse and other animals.

DISTOMATOSIS, LIVER ROT, OR FLUKE IN SHEEP.

By G. MAYALL, M.R.C.V.S.

THIS disease is caused by two parasites called distomes (flukes), the one a large one—distomum hepaticum—and the other a small one—distomum lanceolatum. Both parasites are leaf-shaped, broad in the middle part, and with suckers at the anterior ends, and they attack the liver and bile ducts of sheep affected. The sheep when grazing take up the encysted form of the fluke which is present in the body of a snail (limnæa truncatula in this country; physa tropica according to Mr. J. Gilchrist, M.A., in South Africa); they may also swallow it in the cercarial form in contaminated drinking water.

A short history of the life cycle of the fluke makes the method of contracting and spreading of the disease by the sheep understandable. The flukes in an affected sheep lay eggs; these eggs are voided in the fæces on to the pasture or bare land, and are carried to water by wind, rain, insects, and feet of animals. The egg develops and becomes ciliated in the water, and after forming into a creeping larva enters the body of a snail, where it produces other larvæ by budding. The larvæ progress, and developing into a further stage, when they are known as cercariæ, they leave the body of the snail

and swim about in the water. They then re-enter the body of the mollusc and encyst themselves there and form pupæ. The mollusc, when taken up by the sheep, protects the pupa during its passage into the sheep's stomach; gastric juice dissolves the mollusc, liberates the pupa, and it gains access to the liver by its duct. In this way, partly by spending a period of their life-cycle outside the sheep, and partly by dwelling in the animal as their host, flukes grow in numbers and flourish.

Symptoms of Fluke Disease.

A moderate invasion of the sheep by flukes may cause little loss of condition. In a great number of cases sheep show no symptoms of the complaint until a month or two after infection. There may be slight fever, weakness and loss of appetite, and later on some pain on pressure over the liver region. The mucous membranes become pale, and later on puffy and swollen conjunctivæ may be seen. Appetite fails, rumination ceases, the wool becomes dry and brittle, swellings appear along the trachea, brisket, and on the abdominal wall, and a microscopical examination of the droppings may disclose large numbers of fluke eggs. Owing to abdominal dropsy the condition known as "pot belly" arises. Emaciation increases, anæmia and cachexia develop, diarrhœa and great thirst frequently occur, and the animal dies of exhaustion.

Occurrence of the Disease.

The parasite occurs in marshy pasture everywhere, and wherever sheep graze in such places they are liable to become attacked. In Southern Europe after wet summers the disease is very prevalent—France, Britain, Australia, South Africa, Japan, Hungary, Poland, and Slavonia have all suffered economic losses from severe outbreaks of the fluke disease. The ravages caused by the parasite were known in Europe as far back as 1547, and in 1881 Mr. A. P. Thomas investigated the disease in this country, gave us a proper understanding of it, and recorded his observations in the *Journal of the Royal Agricultural Society*. It has been calculated that 1,000,000 sheep per year die of the complaint in these Isles. In the year 1879 it decimated our flocks, causing disastrous losses. In the East and West of England, Wales, and in the Midland Counties it is of annual occurrence, and is well known to the flock masters and shepherds.

Treatment.—Notwithstanding the widespread prevalence of the disease, little investigation and research have been conducted into the medicinal treatment of the malady. The cause of the complaint and the life history of the enemy parasite have been quite plainly understood for many years. The chief direct remedial measures

adopted hitherto have been doses of salt, sulphate of iron, and gentian These, by toning up the constitution of the stronger and lesser infected sheep, have enabled them to weather the bad time caused by the invasion of the parasite. The drugs, however, have never been asserted to have the power of killing the flukes in the liver. It has generally been assumed that a medicinal remedy strong and active enough to do this would kill the sheep also.

The great losses occasioned by liver flukes have called for years for scientific investigation and research in the adoption of remedial measures. The summons from an economic and agricultural point of view has been as urgent as it well could be, but the driving power at the back of the majority of the various Governments concerned has not been insistent, and strong enough to make them move. It has been left to the French Government to initiate a systematic investigation into the medicinal treatment of the disease and to adopt a successful remedy against it. The drug used not only drives out the parasite, but kills it in its abode within the liver of the sheep. Messieurs A. Railliet, G. Moussu, and A. Henry conducted the French experiments. Preliminary dosage with ethereal extract of male shield fern on five sheep gave gratifying results, and four further subjects for trial were procured. All these animals had been treated a month previously with various drugs without success. Their droppings always contained an abundance of fluke eggs. Each sheep received per day, on four consecutive days, a dose of 5 grammes of ethereal extract of male fern in 25 cubic centimetres of non-purgative oil (equivalent to 70 minims of the extract in 7 drachms of olive or linseed oil). All four sheep were slaughtered four days after administration of the first dose.

No. 1 *sheep* weighed 46 lb., and when slaughtered the liver contained no more than a single large fluke, but the organ was markedly cirrhotic, showing that the disappearance of the parasites was of recent date. The bile appeared normal.

No. 2 *sheep* weighed 66 lb. Two fully-developed large flukes were found alive in the bile ducts, and three adult dead ones. The hepatic lesions were healing; the bile had a normal appearance.

No. 3 *sheep* weighed 70 lb. The liver contained 26 large flukes, living, and one dead. The bile almost normal.

No. 4 *sheep* weighed 46 lb. Liver little affected, showing only one large fluke, which was still alive. Bile normal.

A fifth sheep kept as a check and not dosed weighed 64 lb. When slaughtered the liver was found to be greatly cirrhosed *and contained* 296 *very lively large flukes.* The bile was of a brownish colour. In

all these animals the bile ducts contained a small number of young living flukes.

It is recommended to dose the animals in the morning, two hours before feeding.

The actual price of the remedy in France is 65 francs for 143 lb. of the ethereal extract of male fern; the cost of each dose of 5 or 6 grammes works out approximately at 35 to 40 centimes—*i.e.*, for four doses for one sheep at 1 franc 40 or 1 franc 60, plus 15 centimes for the oil.

Messrs. Gignoux Bros. & Co., of Decines, near Lyons, are specialist manufacturers of ethereal extract of male fern. Their preparation is always of standard strength, which ensures its efficacy of action. It is guaranteed to contain 24 to 25 per cent. of filicine and a minimum of 3·50 per cent. of filicic acid.

Up to the time of the discovery of the treatment of fluke disease by ethereal extract of male fern there was no drug that would kill the flukes *in vivo* in the interior of the liver. It is important that the ether used in preparing the extract be pure, and the absolute root of the aspidium filix be employed. The preparation of Messieurs Gignoux Bros. answers all tests.

TETANUS BACILLUS AND ITS MICROBIAN ASSOCIATES.

By T. M. INGLIS, M.R.C.V.S.

Forfar.

THREE years ago a Clydesdale gelding about eight years old, and belonging to a farmer, received a punctured wound in the sole of the hind hoof and immediately over the pedal joint. The wound was the result of a gathered nail about three inches in length, and had existed nearly ten days before we were consulted. We found the wound highly septic, and a copious discharge of synovia coming from it, accompanied by severe lameness in the animal.

The subject was put in slings, and the wound rendered as free from sepsis as could possibly be done at one time. Although we always inject these cases with anti-tetanin, we resolved to use anti-toxin of a mixed character, as we considered the wound infection to be of this kind.

The patient was injected with anti-suppurin, and the local treatment was continued daily with ablutions of warm creolin solution, and the foot wrapped in an antiseptic poultice.

The anti-toxin was injected on the fourth day afterwards, and then every five days until seven doses were given. After the first injection we observed an alteration in the wound and an increase in the discharge, but towards the fifth day this had diminished considerably. Encouraged so far with the treatment, we continued on the same lines.

After fourteen days we found the wound doing remarkably well, discharge getting much less, and lameness greatly improved. On visiting this case some days later we were greatly annoyed to find symptoms of tetanus exhibited, which became well marked by next day. We cannot say we have confidence in the curative principles of anti-tetanin, but as a prophylactic we cannot recollect a single case of disease after its use—it may have been that the disease had been modified to such a degree by the anti-toxin that it was not recognised. We therefore do not as a rule use the anti-tetanin when the symptoms are fully established.

In the case referred to we continued our treatment with anti-suppurin. The patient remained in the same state for over ten days or so; then we observed the symptoms to be less severe, and on every subsequent visit we found the improvement maintained until the subject made a complete recovery with the exception of a slight stiffness in the region of the pedal joint, which has now disappeared. Although we cannot possibly establish any particular theory with a single case, still this one in practice conveys to my mind that an accidental wound to the foot of a horse is in every case a cause for simultaneous intervention in the wound of the tetanus bacilli and different kinds of micrococci which play an important part in the infection.

The question arises to me: Do we do enough by way of prophylaxis by injecting anti-tetanin alone? It is asserted by some authorities that before the spores of the tetanus bacillus can germinate they must have microbian associates. I believe the tetanus bacilli are implanted in wounds usually in the form of spores, and the most vigorous local treatment of the wound itself is highly essential, but owing to their resistant power the spores are difficult to destroy. The reawakening of these dormant spores is the cause, according to authorities, of late tetanus so often met with in practice, thus demonstrating the necessity of a second dose of anti-toxin, as the effect of the first may have faded. It appears also essential to eliminate and prevent the growth of their associates before the tetanus bacillus has time to produce its toxin. It is believed that a wound may heal leaving spores intact; their reawakening may be the result of an introduction into the part of bacteria which are the usual associates of those of tetanus.

If these spores of tetanus are rendered powerless by destroying their associates, then it looks as if the proper method of treatment in the case of an accidental wound would be to assist in the formation of anti-toxins which the system of the patient is inadequately manufacturing, not only to defend against the products of the tetanus bacilli but also those of their microbian associates.

Associates of virulent organisms with a design for mischief are to my mind similar to the associates of men of doubtful character, and where these are observed together, it is almost certain their purpose is of a bad character and creates an impression that they are evilly disposed.

Pathogenic organisms apparently have associations, and I am convinced they carry out their designs by assisting one another, and I am inclined to believe that if they are separated from their associates many may be rendered powerless. As I have already stated, I am not, favourably impressed with the usefulness of anti-tetanin as a curative, and consider it should not be relied upon if the symptoms are fully established. I understand, however, that some practitioners use it, and have confidence in it. I am inclined to the belief that our proper treatment is to attack the associates both locally and by vaccine, and render the habitat of the organisms less favourable to their germination and assist the defences against the invasion of their toxins.

I trust this attempt of mine will give rise to others giving their opinions and experiences on a very interesting subject in connection with a very troublesome disease.

STREPTOTRICHOSIS OR PSEUDO-ACTINOMYCOSIS IN MAN (PSEUDO-TUBERCULOSIS.)

By G. GAIR, M.R.C.V.S.

Cononbridge.

From different localities reports have, at intervals, been published describing unique cases of disease in man, produced by various bacteria belonging to the genus Streptothrix. These results have been found in abscess of the brain, cerebro-spinal meningitis, pneumonia, and other pathological conditions.

In cases of human infection, described by Flexner, the pathological picture of the disease resembled so nearly tuberculosis in human beings that the two diseases could only be separated by the finding of the causative micro-organism in each case. A descriptive instance occurred recently in —— Hospital, the patient, a man just past middle age, showing all the clinical symptoms of pulmonary tuberculosis.

The sputum in the case was copious, very tenacious and dark, almost like a prune juice example. At short intervals sputum from the patient was supplied to me by the medical attendant for examination for T.B., but invariably the examination failed to find any evidence of the bacilli of tuberculosis.

My attention was attracted by the presence of acid-fast, long wavy filaments while examining this material with Zeil Neilson's stain.

With Gram's stain, large numbers of the diplo-cocci of pneumonia and the diplo-bacillus of Friedlander were also discovered.

The latter so predominated that pure cultures were obtained.

These two organisms were not, however, sufficiently abundant to account for the grave pathological changes occurring in the patient's lungs. The thread-like filament found in the stained sputum and cultures suggested the examination of the material for actinomycosis. Accordingly culturations were made on glycerine agar, blood serum, and potato. The cultures on the latter when fully developed had a very characteristic actinomycotic appearance, showing a dull grey, raised and wrinkled growth of considerable thickness, occasionally of a bright sulphur yellow or light chocolate colour, somewhat similar to the lichenous growth commonly seen on apple trees.

Stains were made of these growths, and were no doubt, as regards the nature of the disease (spreading by continuity) and the reason why infection was produced, undistinguishable anatomically from tuberculosis; the patient suffered from "streptotrichosis" and not from tuberculosis. The disease in man somewhat closely resembled that observed in animals—there is less tendency to localisation or to abundant formation of connective tissue. The tendency of the disease in man is to become chronic. The disease spreads by continuity and the tissue seems unable to resist its invasion; besides, secondary embolic foci may occur, perhaps the commonest seat in man being the liver.

The filaments from the cultures in the case were well seen, as they usually are from cultures. They measure about 0·5μ. across, and are usually of great length. The central protoplasm is enclosed in a sheath—in older filaments this protoplasm becomes broken into coccoid bodies giving the appearance of strepto-cocci; the cocci may break out from the sheaths. These bodies are regarded as gonidia, the clubs are involution forms, perhaps produced by the resistance of the tissues. When pus secretions or teased specimens from human sources are stained by Gram's method, the filaments and the gonidia; are Gram positive, while the clubs situated around the periphery and showing a radiating structure do not usually stain by Gram's method. With carbol fuchsin and picric acid, the fungus stains red and the tissues yellow. In the bovine organism, the clubs stain well with Gram's method, the hominis variety being stunted; in the hominic variety also the prominent central filamentous network, which is usually well developed in actinomycosis of the human subject, is generally replaced by a mass of debris in the bovine type.

The dichotomous branching of the individual filaments enclosing the protoplasm in the case showed very marked and distinct branching,

and these again showed the same branching habit ; numerous polymorphonuclear cells as well as hyaline and mononuclear cells were present. Some of them contained portions of the filaments within them.

Actinomycosis or ray-fungus has exhibited a variety of infections due to different species of streptothrix, instead of being (as formerly believed) a single disease entity caused by a single micro-organism (actinomycocis bovis). Some accordingly substitute the name " Streptotrichosis " for " Actinomycosis." Several pulmonary cases of streptotrichosis have been reported, wherein the physical findings could not be distinguished from those of tuberculosis.

The sputum and pus from cavities of the lungs in these cases contained branched threads which were as acid-fast as tubercle bacilli. Various investigators have described several varieties of streptothrix, as the cause of pulmonary infection. Leptothrix buccalis is a common non-pathogenic organism of the mouth, and belongs to the fission-fungi type. It frequently appears in the sputums in pulmonary gangrene and is known as " Leptothrix pulmonalis."

It is differentiated from the streptothrix because of its non-branching, hence the name " Leptothrix." It also takes on a violet or bluish colour when treated with Lugol's solution. The student should especially observe the possibility of streptothrix infection, or he cannot appreciate the importance of these slender threads with or without branching, and may consider them accidental bacilli or varieties of leptothrix or other non-pathogenic fungi.

The lungs seem to be the seat of the primary infection in most cases of human streptothrix disease.

All cases therefore presenting the physical signs of tuberculosis, wherein repeated examinations fail to find the bacilli of tuberculosis, should be systematically examined for threads of streptothrix.

Streptotrichosis may affect the mouth, neck, lungs, skin, kidneys, conjunctiva, appendix and peritoneum in man. Cases show a preponderance of males, and the influence of occupation and other circumstances involving special exposure to the possibility of infection from a vegetable source is very noticeable.

Eppinger's streptothrix belongs to Group II of the streptothrices —a class possessing acid-fast properties, and showing more active pathogenic properties than the freely growing species of Group III.

Apparently the presence of streptothrix Eppinger causes a pulmonary infection which may not be distinguished anatomically from tuberculosis.

The branching developments occasionally found in the bacilli of tuberculosis is sometimes in typical actinomyces form, and this

peculiarity suggests that it should be placed among the trichomycetes. Foulerton, in his Milroy Lectures (1910), says "There can be no reasonable doubt that at one stage of its growth the bacillus of Koch is represented by branching mycelial threads of this streptothrix type."

The fact being so, the common "bacillary" forms represent the persistent rod segments of a streptothrix. The fungi are probably seldom transmitted directly from one animal to another. The fungus is common on such cereals as barley; it is also found on grasses. Among the reputed bacilli which display acid-fast properties to a marked degree are those having the characteristics of a streptothrix—*e.g.*, bacillus Phlei (Timothy grass), cow dung bacilli. They are found on grasses.

Infection in the human subject may result from inhalation during threshing, or by chewing raw grain. Pathologically the granuloma (the term is becoming obsolete) is first composed of lymphocytes; polymorphonuclear leucocytes then appear, and giant cells are not infrequent. In the central parts are clumps of the ray fungus.

Considerable fibrous tissue often surrounds the granuloma; softening subsequently occurs. Formation of pus and sinus formation follow. The condition of the pus is characteristic and one can hardly overlook its serous or viscid nature, and the golden yellow colours of the parasites present in either case. The fibrous thickening around the granuloma may be mistaken for a sarcoma. Much remains to be done in regard to the study of the higher bacteria which are pathogenic to man and animals.

The trichomycetes form a group between the schizomycetes, or bacteria proper, and the myphomycetes, or moulds. Some confusion exists as to the terminology of the class. The streptothrix group of micro-organisms, while having many affinities with the bacteria, differ from them in many important aspects which link them with the fungi. They develop from spore-like bodies into cylindrical dichotomously branching threads which grow into colonies. The appearance would suggest a mass of radiating filaments. These higher bacteria may rightly be considered, according to their development, as a transition group between the simple bacteria and the more highly developing fungi.

Certain organisms which resemble moulds and bacteria having branching filamentous-forms, and at the same time having a spore-like method of reproduction, are known under the name Streptothrix, or better, Nocardia. It is chiefly in various pathological conditions of the lungs that they are observed, although they have been found in the brain, kidney, glands, etc.

These infections are most likely to be confused with phthisis and

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glanders. Their cultivation is easy, and their staining reactions are midway between T.B. and actinomycosis. In cultivation of fungi it may be well to remember that moulds grow well on media with an acid reaction. If therefore reaction is +2 per cent. or even higher it favours the growth of fungi, and at the same time inhibits the development of bacteria.

Moulds are sometimes treated with 60 per cent. of alcohol for one or two hours previous to placing them on the media to destroy bacteria. This treatment does not injure the mould.

In this case the condition of the patient became gradually worse, pleuritic effusion developed, and thoracentesis had to be performed. Nothing abnormal was found in the fluid withdrawn when examined microscopically. Shortly after, however, when another such operation was performed a further examination of the fluid was made, and cultures were put on agar, when a mixed infection of staphylococcus pyogenes aureus, citreus, and albus was obtained. Death followed soon afterwards. These cases are almost all fatal. On account of the obscure nature of the disease in man it is seldom that the character of the disease is recognised during life. The clinical symptoms in man, and also in animals experimentally inoculated with streptothrix, so resemble those of miliary tuberculosis that the question is naturally suggested whether there are really not more of these cases than the few reported as pseudo-tuberculosis would indicate. It is now recognised that the universal prevalence of genuine tuberculosis has so long occupied our attention that much is taken for granted, and cases in which symptoms and lesions resembling very closely tuberculosis may easily be put down to the credit of the tubercle bacilli.

The following classification serves as an attempt at differentiation of streptotrichosis :—

(1) Leptothrix is characterised by its lack of observed branching, non-wavy growth, stiff, straight threads, in which division seldom (or never) occurs.

(2) Cladothrix. By its false branching, rapid fragmentation; the filaments are long, sometimes a millimetre in length. The cultures have a strong mould smell.

(3) Streptothrix or Nocardia. True and abundant branching, wavy growth, later fragmentation and formation of Conidia, rounded bodies regarded as spores.

(4) Actinomycosis. True branching; characterised by the radiating, wreath-like forms which it alone produces in the living body.

Clinical Case.

UTERINE SEPTICÆMIA (SUBACUTE), ENDOCARDITIS IN MARES.

By R. HUDSON, F.R.C.V.S.,

Retford.

During the period of the last fifteen years I have met with five cases of endocarditis in mares with profuse vegetations on all the valves of the heart.

After the first two I awoke to the fact that it was perhaps common to mares, and probably of uterine origin, for in one case I found it after metritis, and in some of the others there was a history of abortion, while the remainder had no history of trouble, though they had bred recently.

The animals affected have all been shires, and varied in age from three to about fourteen years.

The first case I saw presented a perfect picture of a case of purpura-hæmorrhagica. She was an aged mare, suckling a strong foal about four months old, had been running at grass since foaling, and did not seem to ail anything until a few days before. She now showed the following symptoms: Pulse weak, about 70 per minute; temperature, 103; breathing slightly quickened; head, muzzle, and eyelids tumefied; mucous membranes infected; petechiæ; legs greatly swollen, and oozing blood-stained serum. Anterior chamber of the eye was dropsical, containing red-coloured fluid, and the lower part of abdomen presented a ridged swelling, pitting on pressure. The mare died the day following; the heart showing vegetations on the valves and the tissues infiltration. The womb was not examined.

Case 2.—I was called to foal this mare. It was a breach presentation and a bad one. Laminitis followed, from which the mare was making a good recovery. She was turned away, and on being shepherded one day, about two months after foaling, she was found with bad colic pains. I found her dead on arrival. *Post-mortem* examination showed vegetations on the heart valves and plugging of the vessels of the cœliac axis.

Case 3.—Had no past history, foal dead, mare worked until she showed difficulty in breathing and could not keep up to her work. Examination showed the mare in good condition; she was a beautiful mare with a coat like satin. Pulse weak, jugular pulse very marked, mucous membrane of eye pale-blue tinted veins prominent, mucous membrane mouth pale-bluish, vagina pale, showed petechiæ. Heart sounds weak, indistinct and irregular. Mare was shot, and *post-mortem* examination showed similar lesions to 1 and 2.

Case 4.—An aged mare. Had been treated for a bad cold. Too weak to work, though in fairly good condition. Examination showed general depression, legs swollen, mucous membrane of eyes pale, and veins prominent, pulse fast, soft, irregular; temperature 102, jugular pulse, thin, colourless discharge from nostrils, cough, respiration not increased when at rest, petechiæ in mouth and vagina, heart sounds indistinct. Slaughtered. *Post-mortem* examination showed vegetations on heart valves.

Case 5.—Three-year-old filly, had aborted some four or five weeks before. She was at work, and when seen by me was blowing hard; temperature, 105; pulse, fast, irregular and soft; heart sounds indistinct; petechiæ showing in mouth and vagina. No swellings. Died three or four days after first seeing her. I did not make a *post-mortem* examination

I think the disease originates in the womb, either from retention of some portion of fœtal membrane or fluid at the time of parturition, septic changes taking place and infecting the blood, though they may be so gradual as not to induce any illness at the time. One often sees and hears of mares which have a discharge from the vagina for some considerable time after foaling. Sometimes the os uteri closes up before the discharge is got rid of, leading to an accumulation of pus which may require removal many months after parturition. So it is possible for septic changes to take place in the womb without serious evidence of trouble there, such as may be overlooked by the owner or not thought of sufficient importance to need our attention.

I have noticed that more mares have irregular pulses than horses. With the exception of *Case* 2, none showed any disease of the womb, but this may be accounted for by the fact that sufficient time had elapsed for it to regain its normal condition.

Treatment is useless, but something might be done for its prevention by not treating lightly cases of abortion, retained membranes, and persistent uterine discharge.

Translation.

THE PRESENT WAR AND THE SPREAD OF PARASITIC DISEASES IN MEN AND ANIMALS.

By Professor GALLI VALERIO,

Director of the Institute of Hygiene and Parasitology of the University of Lausanne.

The present war, which has mobilised millions of men, and which brings men and animals together from all parts of Europe, has provided an extraordinarily favourable milieu for the spread of infectious diseases, as well in the warring States as in neutral countries. The

spread of these diseases is favoured by the abnormal relations under which at present the soldiers, the civil population, and the animals have to live. One knows, indeed, the great influence which the numerous predisposing moments exercise in the spread of infectious diseases, while they weaken the defensive forces of the system against the causative factor of infection. Clinical observation and animal experiment have shown us unmistakably that immunity, even if we suppose it well established, may be overcome, while the individual ability to resist disease diminishes. The disease (K) may be, in fact, understood as resulting from the two components, virulence of the causative organism of the disease (V) and the resistance of the system to disease (R). It stands in direct relation to the first, and in inverse ratio to the second $K = \frac{V}{R}$ (B. Galli Valerio, "Immunity and Resistance in all Maladies," Milan, 1897).

But now consider all elements favourable to the origin of infection in the present War. On the one hand, it is supported by massed bodies of men and animals, by lack of cleanliness, soiling, and impurities of the earth, water and nutriment, by sickness and disease, and by apparently cured subjects it may be insidiously conveyed. On the other hand, the power of resistance of the body is considerably weakened under the influence of overstrain, insufficient nourishment, and moral and psychic shocks.

Under these circumstances new diseases can break out, or ailments previously present in the system and in the latent stage may take a quick and severe course. On all these grounds epidemics and epizootics may break out at any moment in the fighting as well as in the neutral countries. One may not cherish the thought that the epidemics of to-day occur with less violence than in former times. The history of the last epidemics of plague, cholera, spotted typhus and pox show us that these diseases, if they break out among a debilitated people, and under conditions in which the energetic regulations of modern hygiene are difficult to apply, produce the like devastations as in earlier centuries. It suffices to recollect the devastations due to the plague in India, cholera in the first Balkan war, and spotted typhus in the present war in Serbia. It must not be forgotten at present that outbreaks of infectious diseases in a country that has not known the particular malady for a long period of years may assume an especially violent form. Thus it has been seen that spotted typhus, conveyed into Germany by Russian prisoners, occurs in much severer form among the Germans than among the Russians. It may be shown, further, that different infectious diseases, brought about by varied stocks of one and the same organism, may differ greatly in their

virulence. So also a disease which already exists in a country may assume a very severe form by conveyance of the causative organism over its borders from another region.

It is, perhaps, useful to indicate here a few of the most important diseases of men and animals which may occur here in Switzerland in the course of the present war, either as isolated outbreaks or as epidemics.

I limit myself only to those forms of disease that can be transmitted directly or indirectly from man to man or from animal to animal. I notice also such diseases as may be observed in interned or imported animals, but which in Switzerland do not find the necessary conditions of life for further spread. I will group the different diseases according to their actiology, and at the same time mention those which may occur exclusively in man or animals, or both together. If I encroach here on the diseases of animals this is done not only for the reason that different ailments affecting them are transmissible to man, but also because at present they cause great economic losses, and so indirectly exercise a great influence on the nourishment of man, and, as a result, also on his health.

Measures against these old and new diseases, which the present war might introduce into Switzerland, must therefore comprise the employment of the strictest hygienic regulations to strengthen the resisting power of single individuals, and to combat the causal organism of infection and anything that may contribute to its further spread.

I will summarise shortly the general lines of precaution to be adopted.

(1) Strict carrying out of the hygienic regulations with regard to the mode of living of both men and animals (ventilation, lighting, careful collection and removal of dejecta and rubbish, cleanliness of the dwellings, stairs and passages, camping places, and courts and yards). One can never impress sufficiently how dangerous spitting on the ground is, and what bad results accrue from unclean and badly built privies and latrines.

(2) Strict hygiene of towns (removal of rubbish and excrement of men and animals, control of drinking water). The attention of the authorities must be specially given at this time to the drinking water. One must first of all get rid of the prejudice that in spring water supply the diseases which are transmitted through drinking water can no longer occur. Spring water is very often greatly contaminated by surface water. This the more so because the so-called spring water is very often nothing more than surface water which has only passed through a thin layer of soil. The more I see the more I am convinced that the settings and service are very often badly constructed, so that water occurring pure at the spring becomes contaminated in the course

of its further distribution and service. Before resorting to chemical and bacteriological analyses one should always have the settings and services tested by local inspection. Analyses should only be undertaken when one is satisfied that these technical points cannot be implicated in any way. Where it is not possible to obtain pure drinking water one must always fall back on purification measures. The chloride of lime method is recommended in these cases as being cheap and efficacious.

(3) Strict control of viands and drink. Nutriment and victuals of little value as regards quality weaken the system and produce a predisposition to disease. If they are contaminated with parasites they can themselves cause infection. Meal and flour play the double rôle in this connection, and milk and meat may do likewise. Through hyphomycetes tainted meal or flour not only has a disagreeable taste, but it may cause severe illness, *e.g.*, B. pellagra. Watered milk brings signs of mal-nutrition as a result, especially in young children. Contaminated milk and milk from sick animals may cause direct diseases (tuberculosis, typhus, diphtheria, foot and mouth disease, scarlet fever). The use of the flesh derived from sick cachectic animals can cause diseases (para-typhus, helminthiasis). In view of the great rise in price of meat, we cannot altogether exclude the flesh of infected animals, except that of cachectic subjects, from consumption, but we must take all precautions to protect the consumer from infection by the different sterilising processes (refrigeration, cooking or steaming, and salting). The over-keen destruction of tuberculous meat, as practised in many a place before the war, was, from a hygienic standpoint, more to be deplored than welcomed. There was the fear of a wholly hypothetic danger to a section of our nation in nourishing themselves on this class of meat which must have as a result a decrease of the natural ability to resist infection. In legislating against adulterations fines, in my view, do not suffice. In repeated cases the best way is to publish the names of the delinquents. This system, where it has been adopted, has produced gratifying results.

(4) Cleanliness of the body and clothing. Dirtiness of person and attire favours the development of a whole rank of parasites. Among these are hyphomycetes, which cause ringworm, scab mites (acarina), the different kinds of lice of men and animals (hœmatopinus). These parasites can not only cause severe symptoms in themselves, some among them serve as intermediate hosts for a number of very dangerous infective organisms. Through lice, for example, recurrent fever (spirochætosis) and spotted typhus may be transmitted and spread abroad. To the care of the body attention should also be directed to the village house and shop accommodation; cheap, well planned and

suitable structures can be provided. In schools the cleanliness of the children should be supervised: lice occur too frequently among them. At the present time we ought to insist more than ever on the cleanliness of domesticated animals. Not only on account of the high price, which ought to act as an incentive to keep the animals in as good a state of health as possible, but also because ringworm and scab which attack the animals may also be transferred from them to man.

(5) Repression and destruction of the arthropods which develop outside or in dwellings, and which directly or indirectly can exert an injurious influence on men and animals. Great cleanliness of dwelling places plays a very important rôle in the war against bugs, fleas, papatici (phlebotomus, a blood sucking fly), and flies. To combat the fly pest one should attack their larvæ directly, and also protect food beforehand from contact with flies. Of great importance also is the war against gnats, and not solely because of their annoying attributes. In Switzerland we have three species of anopheles which are implicated in the transmission of human malaria (A maculipennis, bifurcatus, nigripes). Since we also have many malaria carriers among the interned, so through both these agencies we can have malaria zones in our country similar to those that have been noted in certain regions of France and in Flanders. On the contrary, it is little credible that malady zones will be caused by the filaria of man, although among the interned it is highly probable that carriers of these thread worms may be found. One must also wage war against ticks, which, in the different diseases caused through piroplasms in animals, act as intermediate hosts.

(6) One must therefore proceed to discover as early as possible all individuals who are attacked by infectious diseases or become continued harbourers of pathogenic organisms, in order to isolate them and subject them to energetic treatment. In this connection one must be very strict as regards notification of infectious diseases, as well on the part of the doctor as the veterinary surgeon. In the army it is of the greatest importance to seek out venereal disease. Hand in hand with this precaution must go the control of prostitution as well as the distribution of protective salves or composts to men. We do not forget that soldiers infected in the service may infect their families, and so produce further centres of venereal diseases.

(7) Provision of isolation pavilions of roomy and wide structures capable of easy disinfection. Above all, handy disinfecting apparatus for jets of steam should be provided. These utensils are relatively cheap now, and can be worked by every man without any special knowledge. In order that disinfection can be thoroughly carried out, it is necessary that a specially formed body of men should deal with this matter.

(8) Inoculations against all diseases, as well in men as animals, in regard to which effective inoculation has been decided. Against certain diseases regular carrying out of inoculations (pox, symptomatic anthrax), against others on the outbreak of epidemics (bubonic plague, swine fever, etc.).Of the highest value for the troops also are the present poly-valent vaccines which at the same time protect against typhus, paratyphus, cholera, etc. All these precautions must go hand in hand with intensive hygienic enlightenment of the population, be it by schools of instruction, conferences, or the wide circulation of pamphlets.

Modern hygiene under the present difficult circumstances, as well as at the height of her strenuous task, has proved stable and strong.—*Swiss Veterinary Journal* G. M.

Review.

DISEASES OF THE DOG AND THEIR TREATMENT. By Dr. Georg Muller, of Dresden, and Dr. Alex Glass, A.M.V.S. (McGill), Professor of Canine Medicine in the Veterinary Department, University of Pennsylvania; pp. 506, illustrations in text 492, full-page plates 16. Price 25s. net. Publishers: Baillière, Tindall and Cox, 8, Henrietta Street, Covent Garden, London, W.C.

This is the fourth edition of this book, which has been enlarged, revised and amended by Professor Alex Glass. It is a comprehensive work, and perhaps the most profuse one on the ailments of the dog that we have in the English language. There are full sections on the general examination of the dog to decide between health and illness, the organic diseases, constitutional diseases, chief conditions indicating surgical treatment, diseases of the eyes, ears and skin, and special chapters on black tongue (canine typhus), uncinaria canina (hookworm), and serum therapy, with special reference to its use in distemper. We agree with the authors in their conclusion that up to the present time "it cannot be said that any serums or vaccines for distemper have been proven to be of scientific value."

There is much in the volume that can be read with pleasure and profit, and all men interested in the advance of canine medicine and surgery ought to possess it. Some good tips can be obtained from a careful perusal of its pages, and little fault can be found with most of the deductions of the authors. At the same time we think that many really knowledgeable canine practitioners will find much in the work to criticise. The more books we read on canine diseases the more we become convinced that, despite the Britisher's self-depreciatory attitude as regards canine ailments and treatment, the best veterinarians among us can teach other nations something about dog diseases and their treatment, and personally we would still have no hesitation in claiming the very front rank for some of our countrymen in this branch of veterinary science.

The weakest point in the book in our opinion is that of the illustrations. Fig. 28 on page 67 conveys nothing enlightening to the

discerning eye. It might be that of a nervous dog, one spoilt by its owner, or one in perfect health, and certainly it shows nothing pictorial as to the worst stages of intestinal obstruction in the dog. The illustration at page 69 is quite out of date. Any veterinary surgeon who administers enemas to dogs in this fashion at the present day has mistaken his vocation. The stern of the dog will be like that of a ship in distress, and the operator, if paid by time, will have a good thing on. The illustration facing page 136 might answer with a china dog off a mantelpiece, but we doubt its practicability with one of flesh and blood. Fig. 82, page 194, is old fashioned and non-explanatory, and the part protruded looks more like a sausage than a bladder.

The bandaging up of a dog with fracture, as illustrated in Fig. 105, is quite unnecessary, and there are grave objections to leaving a bandage on for, say, six weeks or less, in the position indicated on page 350. We write this after experience of about 200 cases of fractured limbs in the dog, with a high average of cures. For years we have preferred using a wire écraseur to a hooked forceps for the holding of protruded membrana nictitan before cutting it off in the dog. The advantages of its use are obvious. The muzzle illustrated in Fig. 158 might do on a patient, docile animal, but we can see it soon becoming relegated to the "great unknown" by some of the ailing subjects we get.

If any veterinary surgeon acted as illustrated in Fig. 100 with a dog having tetanus we should return a verdict of culpable homicide if we were called in to act on the jury at his death.

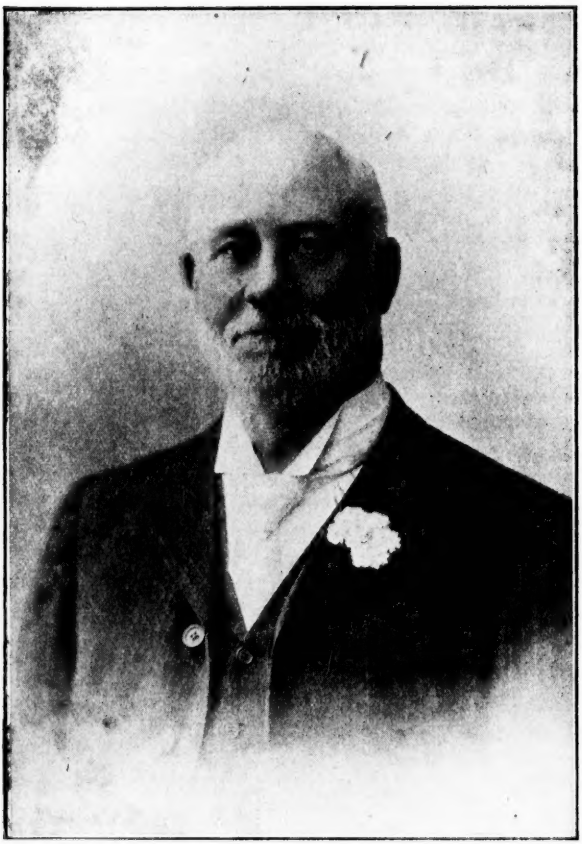
Now as to a few statements made in the text. On page 279 we find the following remarkable observation: "The use of agents for reducing the temperature (in distemper) is objectionable, as they not only deprive us of the symptom of temperature, which is of the greatest importance during the course of the disease, but cause more or less depression of the heart." Not to mention agents that reduce fever without depressing the heart, we think any veterinary surgeon who does not take the temperature of a dog suspected of distemper, before he gives it any medicinal agents at all, is negligent. The number of dogs we have treated successfully for distemper with sodæ hyposulph. and liquor ammon. acet., puts the tin hat on this argument. Apart from this draconic statement we have nothing but praise for the pages on distemper. We find no mention of some clinical facts in examining dogs suspected of tuberculosis. In two out of ten cases we have diagnosed we found tubercles on the palate and pharynx, and we think a careful examination ought always to be made of these regions, and gradual emaciation and unthriftiness ought to be taken into account also. The usefulness of the ophthalmic test in suspected cases is quite rightly given due prominence by the authors.

A grave omission in a work on the diseases of the dog is lack of any reference to interdigital cysts. We find none in this book.

On page 325 we note calcium phosphate given in a prescription for rickets. Now the best men know that this salt of lime is not assimilable by the dog—chloro-phosphate of lime is the right preparation to use.

The publishers have done their part of the work in their usual first-class style.—G. M.

WILLIAM SHIPLEY, F.R.C.V.S.



JAMES FERGUSON SIMPSON, J.P., F.R.C.V.S.

Biography.

WILLIAM SHIPLEY, F.R.C.V.S.

By the death of Mr. William Shipley, F.R.C.V.S., our profession loses one of its best and brightest ornaments, and East Anglia a practitioner who was right in the front rank as a man and a veterinary surgeon. As a man Mr. Shipley was straight, genial, generous, and broad-minded; no narrowness or pettiness ever pervaded his outlook on professional matters, and he was equally at home in the intricacies of town practice or in the strain and difficulties of carrying on veterinary work and duties in the country and among agricultural clients. To meet him was a pleasure, and to know him was an education. The son of a man whose name was a household word in veterinary circles in East Anglia, he succeeded in adding fresh laurels and lustre to the name he inherited by the life he led and the work he did. For sixteen years he was an active and earnest member of our Council, and did valuable work therein both in committee and in open deliberation and debate. He graduated in 1888, took his fellowship degree in 1893, became a member of Council in 1901, and was Vice-President from 1906 to 1910. He was a member of the Chamber of Agriculture for Norfolk; whilst as Secretary and Treasurer of the Victoria Veterinary Benevolent Fund his yeoman and pioneer work is known to all of us. He held many offices as inspector to Horse Show Societies in Norfolk and Suffolk, he was an inspector to the Board of Agriculture, and also acted as Veterinary Inspector at the Royal Show and at Islington on various occasions. He was President of the National Veterinary Association in 1907, and those of us who attended the meeting at Yarmouth will never forget the right royal way in which the thing was done. Mr. Shipley had held all the posts at different times in the E.C.V.M.A. He was ever a friend to his professional brothers and a willing helper to them in any difficulties. To the poor stockowner he was generous and helpful, and he found time in his spare moments to inaugurate such a useful institution as a local Pig Club, which enabled poor men to insure their pigs.

The fine and valuable life of the subject of our memoir has been cut off all too soon. To his wife and son (Capt. William Shipley, M.R.C.V.S.) we extend our deep sympathy. Of Mr. William Shipley it may be truly written that he was never weary in well doing; he worked nobly and climbed well, and early in life understood the importance of "hitching his waggon to a star."

G.M.

JAMES FERGUSON SIMPSON, J.P., F.R.C.V.S.

THE death of Mr. James Simpson has taken from us a man whose unflinching loyalty to our profession left many landmarks behind. President of the Royal College of Veterinary Surgeons in 1895–96, Vice-President and Member of Council for many years, Mr. Simpson was ever to the fore when good work was to be done for veterinary science, and it was largely owing to his unsparing effort that the Army Veterinary Corps occupies the high position it now holds. His time, energy and money, were never refused when asked for, and his hospitality as a host on numerous occasions when President of local Veterinary Societies was unbounded. At the National Veterinary Association he was a regular attendant and a prominent speaker.

In the Maidenhead district of Berkshire he was held in the highest respect, being elected Mayor of the Borough for 1891–92, and acting on the Town Council for many years. He was a Justice of the Peace and the Senior Magistrate of the Borough, his judgments being recognised as always just and fair.

Although of late years incapacitated through illness from taking active part in any professional or business affairs, his presence will be much missed, for his name had become a household word in the profession. Mrs. Simpson had predeceased him by a few months, and he leaves a son, Major Percy Simpson, A.V.C., at present the Commanding Officer of a veterinary hospital, actively engaged in the service of his country.

PUBLISHER'S NOTE.

The Australian Supplement MSS., due to appear in the January issue, was unfortunately lost on the *S.S. Arabia*. A duplicate copy of the Manuscript has now safely reached us and the supplement will be published in the April issue.

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